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Phase diagram of an ideal three-dimensional antiferromagnet with random magnetic anisotropy[1] PAVEL BORISOV, FELIO A. PEREZ[2], TRENT A. JOHNSON, TUDOR D. STANESCU, DAVID LEDERMAN, West Virginia University, MICHAEL R. FITZSIMMONS, Los Alamos National Laboratory, ADAM A. ACZEL, TAO HONG, Oak Ridge National Laboratory — The magnetic phase diagram of three-dimensional (3D) antiferromagnets with random magnetic anisotropy (RMA) is not well understood because systems studied experimentally to date have complicated magnetic structures with competing two-dimensional and three-dimensional exchange interactions. The properties of epitaxial thin films of the 3D RMA antiferromagnet $Fe_xNi_{1-x}F_2$ thin films grown on (110) MgF_2 substrates were investigated by magnetometry and neutron scattering. $Fe_xNi_{1-x}F_2$ is an ideal 3D antiferromagnet with which to study this problem due to the single-ion anisotropy energies of the transition metal site which tend to order Ni^{2+} and Fe^{2+} spins perpendicular to each other. The magnetic phase diagram determined from these measurements was analyzed using mean field theory. Regions with uniaxial, oblique and easy plane anisotropy were identified. An anisotropy glass region was discovered where a Griffiths-like breakdown of long-range spin order occurs.

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